Chapter 8

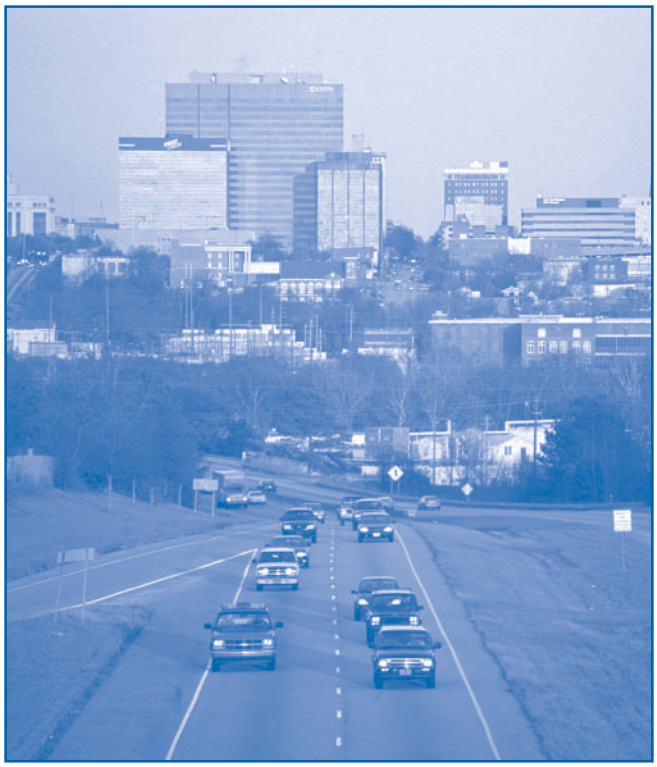
Alternative Transportation Fuels

What are alternative fuels?

The term *alternative fuel* is used to describe fuels other than gasoline that can be used to power our cars. In 1992, the U.S. Congress passed a law called the "Energy Policy Act." This Act made it a law for governments and utilities to use alternative fuels made in the United States to power some of the vehicles in their fleets. The fuels that must be used are natural gas, propane, electricity, ethanol and biodiesel.

Why are alternative fuels important?

The United States uses more oil than any other country in the world and a little less than 50 percent of that oil comes from the U.S. The rest of it is imported mostly from Middle Eastern countries. The United States' dependence on oil from other countries makes it very vulnerable and jeopardizes national security.



In the 1970s, the Arab nations of the Organization of Petroleum Exporting Countries (OPEC) announced an *embargo* on exporting oil to the United States. This means that they decided to not sell oil to American companies any more. They did this because they were angry that the United States supported Israel in the Arab-Israeli War. As a result, oil prices in the United States skyrocketed because there wasn't enough for everyone. Gasoline was *rationed,* meaning that people were only allowed to buy it on certain days and often after long waits. This had a severe effect on our economy and President Richard Nixon announced that the United States must attempt to use less oil.

Congress passed many laws in the 1970s to achieve this goal and those laws received support from Presidents Gerald R. Ford and Jimmy Carter. Some of these included new vehicle efficiency standards, and also the 55 mile-an-hour speed limit. This was passed because vehicles operate most efficiently at this speed. All these laws had a positive effect.

Oil prices rose again in 1978 with the Iranian Revolution and in 1992 following the Gulf War. In 1992, President George Bush, father of the President George W. Bush, championed the passage of the Energy Policy Act. This law was intended to drastically reduce our dependence on foreign oil by increasing the use of domestically-produced fuels in government and utility-provider fleets. Beginning in 1996, fleets were required to begin purchasing alternative fuel vehicles (AFVs). The percentage of AFVs was increased each year and by 2001, 75 percent of new vehicles purchased had to be capable of using alternative fuels.

In spite of this law, demand for oil continues to rise. Now Americans are using roughly 19.5 million barrels of oil a day, the most ever in our history, with 54 percent of it coming from foreign countries.

Such widespread use of oil has another effect besides oil dependence. Overuse of fossil fuels has caused significant air pollution throughout the United States. When most people think of air pollution, they think of Los Angeles or Houston. However, Charlotte and Atlanta, our neighbors to the north and south, have some of the highest pollution rates in the country. Even in South Carolina, air quality is threatened by emissions from gasoline-powered cars and trucks. Fortunately, alternative fuels can help ease those problems as they burn more cleanly than gasoline and diesel fuel.

The Alternative Fuels

Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG)

Natural gas is domestically produced and readily available in the United States. Natural gas also is clean burning and produces less pollutants than reformulated gasoline. Natural gas can either be stored on board a vehicle in tanks as compressed natural gas (CNG) or cryogenically cooled to a liquid state – liquefied natural gas (LNG).

Natural gas is a mixture of hydrocarbons — mainly methane (CH4) — and is produced either from gas wells or in conjunction with crude oil production. Natural gas also is used for heating and cooling homes, cooking, clothes drying and in businesses.

Although one of the cleaner-burning alternative fuels, natural gas is not yet common or used very widely. The vehicles typically cost about $3,500-$5,000 more than a regular gas vehicle and the refueling stations cost anywhere from $400,000 for a “fast-fill” station that fuels each vehicle in just a few minutes to $3,500 for an in-home compressor that fills a vehicle overnight.

Propane (Liquefied Propane Gas, LPG)

Propane or liquefied petroleum gas (LPG) is a popular alternative fuel choice. In fact, propane has been used widely for years in agricultural communities. Like natural gas, propane produces fewer vehicle emissions than reformulated gasoline. Propane is produced as a by-product of natural gas processing and crude oil refining.

Propane is a simple mixture of hydrocarbons, mainly propane/propylene (C3S) and butane/butylene (C4S). Propane also is a popular choice for home heating and outdoor cooking.

Propane vehicles also cost more than their gasoline counterparts. However, fueling stations are fairly inexpensive. More than 350,000 vehicles, mostly in commercial fleets, are traveling the nation’s highways under propane power.

Electricity

Electricity can be used to power vehicles. Electric vehicles (EVs) store electricity in batteries. EV batteries have a limited storage capacity and must be replenished by plugging the vehicle into a recharging unit. The electricity for recharging the batteries comes from a special electrical outlet in the home or business, or from distributed renewable sources such as solar or wind energy. EVs are called “zero-emission vehicles” because they release no harmful emissions into the air.

The cost of “refueling” an EV is minimal, but an EV certified to run on the highway is very expensive. Although newer battery technology shows promising developments, most EVs have a range of only 50-100 miles before recharging is needed.

Ethanol (E-85)

E-85 is a blend of 85 percent ethanol and 15 percent gasoline. Ethanol is an alcohol-based fuel produced by fermenting and distilling starch crops that have been converted into simple sugars. Typical feedstocks for this fuel include corn, barley and wheat. Ethanol also can be produced from "cellulosic biomass" such as trees and grasses. Most ethanol used in the United States today is made from corn.

E-85 can be used in "flex-fuel vehicles." These vehicles also can run on pure gasoline. Flex-fuel vehicles are very common in the United States today – many auto manufacturers now offer them and are part of their standard inventory. Unlike other AFVs, there is no additional cost for purchasing this vehicle. Because of this, and also because they can run on gasoline, they are a popular choice for fleet managers. Ethanol fuel is, however, sometimes more expensive than gasoline at the pump, although it is better for the environment. A problem in South Carolina is the lack of a supply of ethanol.

Biodiesel

Biodiesel is manufactured from vegetable oils or recycled restaurant greases. Biodiesel is safe, biodegradable and reduces serious air pollutants such as particulates, carbon monoxide, hydrocarbons and air toxins. Blends of 20 percent biodiesel with 80 percent petroleum diesel (B20) can be used in any diesel vehicle. It also can be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems. French fry-fueled Fords may be in your future!

Alternative Fuel Use in S.C.

S.C. government offices began purchasing AFVs in 1996, as required by law. But while the Energy Policy Act required that governments buy AFVs, it did not demand that they use any alternative fuel. Since some AFVs can run on either an alternative fuel or regular gasoline, we have many AFVs but few alternative fueling sites. This is partly because of the high cost of installing the alternative fueling equipment.

This situation, however, is changing. Since 2000, South Carolina has developed three new AFV refueling sites with plans to develop more.

What kind of fuel do we use?

South Carolina's Office of Fleet Management has surveyed all government groups in the state to determine how many and what kind of AFVs they had. They also surveyed fuel providers to find out where our AFVs could go to refuel as state employees drive these vehicles to go about the state's business. This survey helped us discover that while we have about 2,500 AFVs operating in government fleets in South Carolina, we don't have much alternative fuel to put in them. This survey also helped us plan where to put alternative fuel stations in the future.

ETHANOL

Ninety-three percent of the AFVs operating in S.C. government fleets (about 2,300) are flex-fuel vehicles. Since these vehicles can run on either gasoline or E-85, most continue to be operated on gasoline.

Since 2001, two stations that dispense ethanol opened in South Carolina. United Energy Distributors, Inc., a private fuel supplier in Aiken opened the first public multi-alternative fuel station in the country in 2001. It sells E-85, in addition to propane and biodiesel. Anyone can buy fuel at this facility, making it the only publicly-accessible AFV refueling site in the state. The S.C. Department of Health and Environmental Control opened an E-85 refueling site in Columbia in 2002. This facility serves only vehicles owned by federal, state or local governments, not the public. There are more than 600 flex-fuel vehicles in government fleets in Columbia – this was their first access to E-85.

More ethanol facilities will open soon across the state. Many private citizens own flex-fuel vehicles and they will be able to take advantage of using this alternative fuel as well.

BIODIESEL

It's hard to count the number of vehicles using biodiesel because any diesel vehicle can use it. It is known, however, that the state fleet and

some federal fleets in South Carolina have purchased biodiesel in bulk to use in their vehicles.

In addition, the S.C. Soybean Board is studying possibilities for building a biodiesel production facility in South Carolina. The state currently purchases biodiesel from Kentucky – making it more expensive to use.

CNG

In 2000, the Clean Cities Coalition worked closely with the Central Midlands Regional Transit Authority (RTA) as they made decisions regarding the fate of the City of Columbia's bus fleet. Thanks in part to their efforts, RTA decided to purchase seven new compressed natural gas (CNG) transit buses when they replaced the aging fleet in 2002. These buses reduce nitrogen dioxide and hydrocarbon emissions by 6,296 pounds per year over a ten-year period – resulting in a cleaner City of Columbia.

The Coalition and the S.C. Energy Office also worked to expand the capacity of Columbia's only CNG refueling station and to encourage other agencies to purchase CNG vehicles. Several city buses are fueled by natural gas as a result of this effort. In addition to the buses, the state fleet owns 70 CNG vehicles.

Local governments and utility companies in South Carolina own some CNG vehicles as well. In addition to fast-fill CNG stations in Columbia and York County, there are slow-fill stations in the cities of Rock Hill and Clemson, and in Greenville County.

PROPANE

There is more propane refueling infrastructure in the state than any of the other fuels because many propane companies use the fuel in their vehicles. But there are only 54 propane vehicles in the state fleet and only one station in South Carolina – the United Energy facility in Aiken – accepts the state's credit card.

Where do we go from here?

Alternative fuel use is very important for South Carolina and our country, because of dependence on imported oil and national air quality problems. There are many organizations in South Carolina that want to help increase the types and amount of alternative fuel used. The Palmetto State Clean Fuels Coalition is trying to organize all the groups and their efforts. This local group is part of a national effort called "Clean Cities" – coordinated by the U.S. Department of Energy.

The Palmetto State Clean Fuels Coalition is committed to developing stronger networks of alternative fuel users in the state. It is reaching out to all existing organizations and programs that show a similar interest in improving the nation's energy security by lessening dependence on foreign oil and reducing emissions of ozone, carbon monoxide and particulate matters from motor vehicle usage.